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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/326,214	06/03/1999	OSAMU TANITSU	103512.99	3924
25944	7590	08/17/2004	EXAMINER	
OLIFF & BERRIDGE, PLC P.O. BOX 19928 ALEXANDRIA, VA 22320			MATHEWS, ALAN A	
			ART UNIT	PAPER NUMBER
			2851	

DATE MAILED: 08/17/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/326,214

Applicant(s)

TANITSU ET AL.

Examiner

Alan A. Mathews

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 November 2003 and 10 February 2004.
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-104 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☒ Claim(s) 1-53, 64-77 and 81-104 is/are allowed.
6) ☒ Claim(s) 54-57 and 78-80 is/are rejected.
7) ☒ Claim(s) 58-63 is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☒ Certified copies of the priority documents have been received in Application No. 08/147,259.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 11/19/03.
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after allowance or after an Office action under *Ex Parte Quayle*, 25 USPQ 74, 453 O.G. 213 (Comm'r Pat. 1935). Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, prosecution in this application has been reopened pursuant to 37 CFR 1.114. Applicant's submission filed on November 19, 2004, has been entered.

2. Applicant's Supplemental Reissue Declaration filed February 10, 2004, complies with 37 CFR 1.63 and 37 CFR 1.175.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 54-57 and 78 - 80 are rejected under 35 U.S.C. 103(a) as being unpatentable over the Japanese Patent document 62-115718 (cited on Applicant's PTO 1449 filed on November 19, 2003) in view of either Jain ((U. S. Patent No. 4,924,257, cited on Applicant's PTO 1449 filed on November 19, 2003), or Nishi (U. S. Patent No. 5,194,893). The Japanese Patent document 62-115718 discloses in figure 1 an illumination optical system arranged to illuminate a slit area on a predetermined plane (see elements 21 and M in figures 1 and 8 and see lines 8-19 of the English Abstract) with an illumination beam. Element 19 is a fly-eye type integrator having a plurality of optical elements each of which has a cross sectional shape that is substantially equal to said slit area (see figures 5, 7, and 9). The bottom of figure 1 discloses a scanning exposure as shown by the arrows. Thus, the Japanese Patent document 62-115718 discloses the invention except for a movable member arranged to relatively move a mask with respect to said slit during scanning exposure on a substrate with said illumination beam through said mask, and to hold said mask at a position on or near said predetermined plane. Jain discloses in figure 1 and column 4, lines 7-17, a movable mask stage 16 for relatively moving the mask 14 with respect to said predetermined plane during scanning exposure on a substrate 10. Substrate stage 12 also moves the substrate 10 during scanning. Nishi discloses in figure 1 a fly eye lens 7 and a movable member (reticle stage 14) for the mask and a movable member (XY stage 18) for the wafer. It would have been obvious at the time the invention was made to a person having ordinary skill in the art to provide the Japanese Patent document 62-115718 with moveable members arranged to relatively move the mask and substrate with respect to the predetermined plane during scanning exposure in view of Jain or Nishi for the purpose of improving the scanning operation and thus producing a better final product.

Allowable Subject Matter

5. Claims 1-53, 64-77, 81-104 are allowed. Claim 58-63 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The reasons for the indicated allowability of the claims are as follows:

The prior art of record does not disclose or suggest an optical integrator having a plurality of lens elements for forming a plurality of light source images based on a beam from a light-source-image forming means, said lens elements having a rectangular cross section, two sides adjacent to each other of the rectangular cross section being different in length, the lens element having a same refracting power both in the direction of the longer side of the rectangular cross section and in the direction of the shorter side; a light supply means including a light source system for emitting light having a beam cross section of substantially square or circle; light source changing means for forming a plurality of light source images, based on the light from the light source system; and a second relay optical system located between the light source changing means and the light source-image forming means, for making a position of the light source images formed by the light source changing means conjugate with a position of the light source images formed by the light-source-image forming means in combination with the other elements recited in independent claims 1 and 16.

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The prior art of record does not disclose or suggest an internal reflection type integrator having two reflection planes parallel to each other for forming plurality of light source images based on a beam from a light-source image forming means, the internal reflection type integrator⁴ having a rectangular cross section, two side adjacent to each other of the rectangular cross section being different in length; the light supply means including a light source system for emitting light having a beam cross section of substantially square or circle; light source changing means for forming a plurality of light source images, based on the light from the light source system in combination with the other elements recited in independent claim 8.

The prior art of record does not disclose or suggest an optical integrator having a plurality of lens elements for forming a plurality of light source images based on a beam from a light-source-image forming means, said lens elements having a rectangular cross section, two sides adjacent to each other of the rectangular cross section being different in length, the lens element having a same refracting power both in the direction of the longer side of the rectangular cross section and in the direction of the shorter side; a light supply means comprising: a collector mirror having an ellipsoidal surface of revolution; a light source located at one focal point of the ellipsoidal surface of revolution so that light emitted therefrom is reflected and collected by the collector mirror; and a collimator lens for converting light collected by the collector mirror into substantially parallel beams in combination with the other elements recited in independent claim 12.

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The prior art of record does not disclose or suggest an internal reflection type integrator having two reflection planes parallel to each other for forming plurality of light source images based on a beam from a light-source image forming means, the internal reflection type integrator⁴ having a rectangular cross section, two side adjacent to each other of the rectangular cross section being different in length; a light supply means comprising: a collector mirror having an ellipsoidal surface of revolution; a light source located at one focal point of the ellipsoidal surface of revolution so that light emitted therefrom is reflected and collected by the collector mirror; and a collimator lens for converting light collected by the collector mirror into substantially parallel beams in combination with the other elements recited in independent claim 13.

The prior art of record does not disclose or suggest an optical integrator having a plurality of lens elements for forming a plurality of light source images based on a beam from a light-source-image forming means, said lens elements having a rectangular cross section, two sides adjacent to each other of the rectangular cross section being different in length, the lens element having a same refracting power both in the direction of the longer side of the rectangular cross section and in the direction of the shorter side; a light supply means comprising: a collector mirror having an ellipsoidal surface of revolution; a light source located at a first focal point of the ellipsoidal surface of revolution so that light emitted therefrom is reflected and collected by the collector mirror in combination with the other elements recited in independent claim 14.

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The prior art of record does not disclose or suggest an internal reflection type integrator having two reflection planes parallel to each other for forming plurality of light source images based on a beam from a light-source image forming means, the internal reflection type integrator having a rectangular cross section, two side adjacent to each other of the rectangular cross section being different in length; and a light source located at one focal point of the ellipsoidal surface of revolution so that light emitted therefrom is reflected and collected by the collector mirror in combination with the other elements recited in independent claim 15.

The prior art of record does not disclose or suggest an internal reflection type integrator having two reflection planes parallel to each other for forming plurality of light source images based on a beam from a light-source image forming means, the internal reflection type integrator having a rectangular cross section, two side adjacent to each other of the rectangular cross section being different in length; a light supply means including a light source system for emitting light having a beam cross section of substantially square or circle; light source changing means for forming a plurality of light source images, based on the light from the light source system; and a second relay optical system located between the light source changing means and the light source-image forming means, for making a position of the light source images formed by the light source changing means conjugate with a position of the light source images formed by the light-source-image forming means in combination with the other elements recited in independent claim 23.

The prior art of record does not disclose or suggest an optical integrator having a plurality of lens elements for forming a plurality of light source images based on a beam from a light-source-image forming means, said lens elements having a rectangular cross section, two sides adjacent to each other of the rectangular cross section being different in length, the lens element having a same refracting power both in the direction of the longer side of the rectangular cross section and in the direction of the shorter side; a relay optical system disposed between the light source image forming means and the optical integrator, for making a position of the light source images formed by the light-source-image forming means conjugate with a position of the light source images formed by the optical integrator in combination with the other elements recited in independent claim 24.

The prior art of record does not disclose or suggest an internal reflection type integrator having two reflection planes parallel to each other for forming plurality of light source images based on a beam from a light-source image forming means, the internal reflection type integrator having a rectangular cross section, two side adjacent to each other of the rectangular cross section being different in length; a relay optical system disposed between the light source image forming means and said internal reflection type integrator, for making a position of the light source images formed by the light source image forming means conjugate with a position of the light source images formed by the internal reflection type integrator in combination with the other elements recited in independent claims 29 and 41.

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The prior art of record does not disclose or suggest an internal reflection type integrator having two reflection planes parallel to each other for forming plurality of light source images based on a beam from a light-source image forming means, the internal reflection type integrator having a rectangular cross section, two side adjacent to each other of the rectangular cross section being different in length; a relay optical system disposed between the light source image forming means and the optical integrator, for making a position of the light source images formed by the light-source-image forming means conjugate with a position of the light source images formed by the optical integrator in combination with the other elements recited in independent claim 33.

The prior art of record does not disclose or suggest providing an illumination optical system that illuminates a rectangular area on a predetermined plane on which a mask is arranged, and which includes an internal reflection type integrator with an exit plane having a shape substantially equal to that of the rectangular area on the predetermined plane as recited in independent claims 43, 76, and 77.

The prior art of record does not disclose or suggest an illumination optical system that forms a plurality of light source images in which the number of light source images arranged in a first direction corresponding to a longitudinal direction of the slit area is different from a number of light source images arranged in a second direction crossing the first direction as recited in independent claims 64, 81, and 83.

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The prior art of record does not disclose or suggest an illumination optical system having an internal reflection type integrator on an optical axis of the illumination optical system and an optical device that changes an intensity distribution of an illumination beam on a pupil plane of the illumination optical system as recited in independent claim 84.

The prior art of record does not disclose or suggest an illumination optical system having a pupil plane including a center area and an outer area around the center area, an illumination optical system comprising a first optical integrator on the optical axis and an optical device which makes an intensity distribution increase in the outer area, in comparison with a an intensity distribution in the center area of the pupil plane, and said illumination optical system illuminating the slit area with an illumination beam; and a moveable member arranged to relatively move a mask with respect to the slit area during scanning exposure on a substrate with said illumination beam through said mask and hold said mask at a position on or near said predetermined plane as recited in independent claim 93.

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The patents on Applicant's PTO 1449 are cited for the same reasons Applicant cited them in his INFORMATION DISCLOSURE STATEMENT. It is noted that the parent to US Patent No. 5,684,567, was previous cited in an IDS filed on June of 1999. It is also noted that U. S. Patent No. 5,684,567 contains an error in that it is a continuation of U. S. Patent No. 5,459,547, and not 5,459,947 as stated on the patent.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alan A. Mathews whose telephone number is (571) 272-2123. The examiner can normally be reached on Monday through Friday from 8:00 AM to 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Judy Nguyen can be reached on (571) 272-2258. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Alan A. Mathews
Primary Examiner
Art Unit 2851

AM